



Woodstock Environmental Offset Project Stage 2

Bi-Annual Progress Report 2023

August 2023

*Report prepared for Budadee Aboriginal Corporation and Pilbara Environmental Offset
Program by Terra Rosa Consulting*

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We acknowledge the Traditional Owners and custodians of country throughout Australia and their continuing connection to land, waters, and community. We pay our respects to the people, the cultures, and the Elders past, present and emerging.

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1. Project Background

For full Project Background refer to the Tharra Rehabilitation Plan: Weed Control Plan.

Since 2021, Budadee Aboriginal Corporation (BAC) in partnership with Terra Rosa Consulting (TRC), have undertaken environmental planning, monitoring and rehabilitation works across the Woodstock Abydos Protected Reserve (WAPR), as a part of the Woodstock Environmental Offset Program (WEOP). The objective of the Woodstock Environmental Offset Program, funded by the Pilbara Environmental Offset Fund (PEOF), is to enhance environmental health of Tharra (the Traditional name of the Palyku Native Title Determination Area within the WAPR), based on both cultural and conservation values. The program is currently in its third year (Stage 2).

BAC's team identified introduced weed species as a priority threat to the environmental and cultural values of the WAPR, and management of priority weed species was targeted as the focus for the WEOP. The focus for Stage 1 (2021 - 2022) was to collect information to inform future weed management actions within the riparian zones in Tharra, the exchange of botanical knowledge between Traditional Owners and scientists and to inform the design of a vegetation monitoring approach and riparian weed control plan to guide Stage 2 of the project (known as the *Tharra Rehabilitation Plan: Weed Control Plan*). During Stage 1, declared pest species Rubber tree (*Calotropis procera*) was identified as a primary weed species of concern for Budadee, as its recent increase in density and distribution directly threatens the rich environmental and cultural values within Tharra, particularly those within the riparian zones of the reserve.

The main objective of Stage 2 of the WEOP is to implement the *Tharra Rehabilitation Plan: Weed Control Plan*, of which the key outcome will be the improvement of condition of at least 1000 ha of vegetation within Tharra. The objectives of the *Tharra Rehabilitation Plan: Weed Control Plan* are as follows:

- Implement a targeted *Calotropis procera* management program, informed by field observations collected during Stage 1 and Traditional Knowledge and values;
- Continue mapping the distribution of weeds within the riparian zones of Tharra, to track the progress of targeted weed control program;
- Collect vegetation condition assessment data within the riparian zones of Tharra, including *Calotropis procera* density estimations, in line with established monitoring and evaluation framework methodology*;
- Further improve the capacity of the Budadee Ranger team to conduct rehabilitation and monitoring activities as per DWER's Monitoring and Evaluation Framework*; and
- Facilitate leadership from Traditional Owners in the delivery of the above objectives and ensure that traditional knowledge and values influence decision-making and that cultural protocols are observed on-country.

Upon direction from DWER's PEOF Team, two of the above objectives were postponed to better align with DWER's Vegetation Monitoring Framework (under development). The varied objectives are denoted with an asterisks.

2. Project Logic

For full Project Logic refer to the Tharra Rehabilitation Plan: Weed Control Plan.

Budadee operates on a Caring-for-Country model. Leadership from Traditional Owners is integrated into the planning and delivery of all work programs, including the WEOP, to ensure Traditional Knowledge and values influence decision making and cultural protocols are observed while on country. The collaboration and exchange of knowledge between Traditional Owners and environmental consultants ensures that management strategies provide the best outcomes culturally and ecologically.

The objectives and trip timing outlined in the *Tharra Rehabilitation Plan: Weed Control Plan* were adapted due to the development of DWER's Vegetation Monitoring and Evaluation Framework, accommodation availability, heavy rainfall events and logistical considerations.

There are five on-country field trips scheduled to be undertaken in 2023; works to be undertaken during these trips include *Calotropis* surveys and control within the riparian areas of the WAPR, opportunistic mapping of non-target weed species and conducted alongside the targeted survey efforts and in relevant CAEM units.

The specific objectives of the five on-country field trips are as follows:

- Conduct targeted *Calotropis* surveys within the rivers systems of Tharra;
- Control all *Calotropis* plants encountered during the targeted surveys, and record the number of juvenile and mature *Calotropis* individuals encountered and controlled;
- Map the distribution of *Calotropis* within the river systems of Tharra; and
- Continue to conduct broad-scale mapping of non-target weed species during the targeted survey effort.

The field data collection methodology is as follows:

- Track logs recorded on three handheld GPS;
 - "GPS 1" recording from the start of the work day until the end (Survey Route),
 - "GPS 2" recording while within river systems (Survey Effort),
 - "GPS 3" recording in areas where *Calotropis* is present (*Calotropis* distribution).
- The number of juvenile and mature *Calotropis* individuals within each occurrence area to be counted and recorded;
- Non-target weed species distribution recorded as point data using the ArcGIS Application QuickCapture.

As of the end of August, two on-country field trips have been undertaken on the following dates: 1st – 6th June 2023 (Trip 1), 10th – 14th July 2023 (Trip 2) and 14th – 18th August 2023 (Trip 3).

Targeted *Calotropis* surveys have been conducted within sections of the three major rivers/creeklines of the WAPR, the Yule River, the Coorong Creek and the Turner

River, and some minor tributaries and drainage channels. Wherever feasible, these targeted surveys were undertaken as light vehicle reconnaissance to maximise efficiency. All *Calotropis* individuals encountered during these targeted surveys were recorded and controlled as per established methodology, with a distinction being made between juvenile and mature *Calotropis* plants when collecting field data (see *Preliminary Findings - Targeted Calotropis surveys and control works*). Broad-scale weed mapping has been conducted opportunistically during the two trips, with a focus on capturing any changes in non-target weed distribution within WAPR. Individual instances of non-target weed species are collected as point data using the QuickCapture App.

Multiple GPS units were used to record the distribution of *Calotropis procera*, the survey effort and all movements within the WAPR. Photos, GPS data and track logs were backed up at the end of each trip, and these will be provided to the PEOF team via their preferred method.

Table 1: Project participants and attendance dates for Trip 1 - 3.

Project participants					
Trip 1		Trip 2		Trip 3	
1st – 6th June 2023		10th – 14th July 2023		14th – 18th August 2023	
Stephen Stewart Jnr.	2 June	Biddy Norman	10 - 13 July	Gavin Cabales**	All
Annabel Stream*	All	Gavin Cabales**	All	Walter Stream**	14 - 17 August
Duane Stream*	All	Walter Stream**	10 - 13 July	Kevin Stream Snr.**	14 - 17 August
Zakiesha Clinch*	All	Margaret Stewart	10 - 13 July	Fred Stream	All
Brandon Dhu	1, 2, 4 - 6 June	Stephen Stewart Jnr.	All	Hazel Lockyer	All
Diana Flanagan	3 June	Stanley Ball Jnr.	10 - 13 July	Stephen Stewart Jnr.	All
James Dolin* (Budadee Ranger Coordinator)	All	Amanda Stream	10 - 11 July	Natalie Stream	All
Danika Penson (Terra Rosa)	All	Brandon Dhu	All	Kevin Stream Jnr.	14 - 17 August
		Leroy Clinch	All	Jackie Hall	All
		Robert Kelly	10 - 13 July	Annabel Stream*	All
		Annabel Stream*	10 - 13 July	Ethan Fernleigh*	All
		Michael Coffin*	All	Keniesha Cabales	All
		Zakiesha Clinch*	All	Drew Hatswell (Terra Rosa)	All
		Ethan Fernleigh*	All	Danika Penson (Terra Rosa)	All
		James Dolin* (Budadee Ranger Coordinator)	All		
		Danika Penson (Terra Rosa)	All		

*Participation in this project funded in-kind through Budadee's Aboriginal Ranger Program.

**Senior Ranger salaries funded by Budadee Aboriginal Corporation.

3. Preliminary Findings

Targeted *Calotropis* surveys and control works

Targeted *Calotropis* surveys have been conducted in sections of the Yule River, Coorong Creek, Turner River and several minor tributaries across the first three on-country trips of 2023 (see Appendix 1 – Maps for map of survey effort). Light vehicles were utilised to undertake surveys wherever access conditions permitted, and in areas of restricted vehicle access surveys were conducted on foot. Two side-by-side buggies, contributed in-kind by two Senior Rangers, were utilised alongside the light vehicles to undertake the *Calotropis* surveys during Trip 3 which significantly improved the efficiency of the works undertaken and allowed previously inaccessible areas of the riparian zones to be surveyed.

All *Calotropis* plants encountered during the targeted surveys have been recorded and controlled as per established methodology. While undertaking targeted *Calotropis* surveys within the riparian zones of the WAPR, track logs were recorded on GPS 2 to document survey effort. Over 107 km of targeted survey effort within riparian habitat was conducted over the first three on-country trips of 2023 (see Table 2).

Table 2: Track logs (km) recorded in riparian zones during targeted *Calotropis* surveys on Trips 1 - 3.

	Yule River	Yule River Tributaries	Coorong Creek	Turner River	Minor drainage lines
Trip 1	6.6	9.5	-	8.9	-
Trip 2	16.8	15.7	0.2	8.6	0.5
Trip 3	24.32	13.05	1.7	-	1.77
TOTAL	47.7	38.2	1.9	17.5	2.3

When a *Calotropis* plant or infestation (multiple *Calotropis* plants in the same area) was observed, the location of the plant or extent of the infestation was recorded as a track log on GPS 3, the number of juvenile and/or mature plants was recorded along with any observations in a field notebook and the plant(s) was controlled by the ranger team. Small *Calotropis* individuals or plants growing in loose, sandy soil were pulled out by hand, and larger *Calotropis* plants were controlled using the 'cut and paint' method.

The 'cut and paint' method entailed severing trees at their base, using either loppers or saws, and immediately 'painting' the stump with Vigilant II herbicide gel (active ingredient 4.47 g/L aminopyralid, 44.7 g/L picloram). This control technique has been shown to be the most effective *Calotropis* control method (Jo Williams, Pilbara Mesquite Management Council, 2021 on-country training).

This year's field methodology, described above, is the same as last year's methodology with the addition of distinguishing between juvenile and mature plants when recording *Calotropis* individuals in the field. The collection of this additional

information in the field will assist with assessing the success of previous control efforts, by distinguishing plants which likely emerged from the seedbank following previous control works and plants which have persisted despite control efforts. When recording this data, *Calotropis* individuals are classified as “mature” plants if they possess at least one of the following characteristics:

- Plants bearing flowers;
- Plants bearing fruit or old seed pods;
- Plants with woody stems; and
- Plants which have regrown following control (ie. living plants possessing a cut stump).

Calotropis plants not possessing any of the above characteristics were classified as “juvenile”.

*Plate 1: A juvenile
Calotropis plant growing
in the Turner River.*



*Plate 2: Rangers
Brandon Dhu and
Duane Stream working
as a pair to control a
mature Calotropis
plant.*



Plate 3: Ranger Stephen Stewart Jnr. holding a Calotropis fruit and teaching new rangers to collect and properly dispose of these to prevent seed dispersal.



Plate 4: Annabel Stream applying Vigilant herbicide to the cut stump of a Calotropis plant growing amongst native vegetation.



Plate 5: (L-R) Rangers Walter Stream, Amanda Stream, Annabel Stream and Brandon Dhu undertaking targeted Calotropis surveys and control on foot.



A total of 1127 *Calotropis procera* plants were encountered and controlled within the Yule River, Coorong Creek and Turner River during the Trips 1 – 3 (see *Appendix 1 – Maps* for a map of *Calotropis* distribution). Approximately 65% of the *Calotropis* plants controlled were juvenile (n = 737), and the remaining ~35% were classified as mature (n = 390) (see Table 3). The distribution pattern of *Calotropis procera* within the WAPR remains the same as observed in previous years, with majority of *Calotropis* plants occurring within the Turner River (974 plants).

Table 3: Number of *Calotropis procera* plants controlled during Trip 1 - 3.

Creepline	<i>Calotropis procera</i>		
	TOTAL	Juvenile	Mature
Yule River	101	52	49
Yule River Tributaries	0	-	-
Coorong Creek	52	37	15
Turner River	974	648	326

Within the Turner River, the infestation south of Pulkunah Spring (site T7) currently accounts for the majority of the *Calotropis* records (824 plants; 528 juvenile plants and 296 mature plants). Similar numbers of *Calotropis* plants were recorded and controlled within the same area last year: 800 *Calotropis* plants within the same 1.5 km stretch of creepline. Last year, a high instance of regrowth following control was observed within this infestation with majority of the mature *Calotropis* plants within the infestation having regrown from cut stumps (previously controlled in 2021). This regrowth of plants following control was again observed this infestation, however it was noted that regrowth appeared to be less vigorous than last year (reduced height and number of stems).

Plate 6: Dense *Calotropis* infestation in the Turner River, south of Pulkunah Spring, prior to control.



Calotropis procera density in 2022 and 2023

In 2022, *Calotropis* was identified and controlled at a total of 18 discrete locations within the WAPR and each discrete location was assigned a site code (see *Annual Progress Report 2022: Field Results*). Eight of these locations were within the Turner River, one was within the Turner River Tributary, four were within the Yule River, two were within the Coorong Creek and three were within the Coorong Creek Tributary. Eight of the 18 locations recorded in 2022 have been subject to *Calotropis* surveys and control works during Trips 1-3, and a decrease in the number of *Calotropis* plants present was observed at six of these locations (see Table 4).

Table 4: Number of *Calotropis* plants recorded at occurrence locations in 2022 and 2023.

Creekline	Site Code	Number of <i>Calotropis procera</i>		
		2022	2023	Difference
Turner River	T1 and T2	250	61	189
Turner River	T3	141	43	98
Turner River	T7	806	824	-18
Yule River	Y1	5	6	-1
Yule River	Y2	1	0	1
Yule River	Y3	1	0	1
Yule River	Y4	1	0	1

Several new *Calotropis* occurrence locations have been recorded during Trips 1-3, due to various factors including increased accessibility in creek lines through use of side-by-side buggies during targeted survey works. These new occurrence locations will be presented in this year's Annual Report. The 2023 Annual Progress Report will also present an in-depth summary and analysis of the data collected on all 2023 on-country trips, field observations, management recommendations and comparisons to data collected during *Calotropis* control works conducted in previous years.

Plate 7: Rangers Jackie Hall and Keniesha Cabaes holding up a *Calotropis* plant in an infestation discovered by Senior Rangers in buggies.



Broad-scale weed mapping

Broad-scale weed mapping was conducted opportunistically during light vehicle reconnaissance and on foot during targeted *Calotropis* surveys, and when travelling between sites. Observed instances of weeds were recorded as point data using the ArcGIS application Quick Capture. Weed mapping was not conducted in areas previously surveyed in 2021 and 2022 unless a notable change was observed. This point data indicates the presence of a weed species in the location of the record but is not representative of the total number of individuals encountered.

Five non-target weed species were identified and recorded, across a total of 121 observations, within the WAPR over Trips 1 - 3 in 2023. The most frequently recorded non-target species were *Cenchrus ciliaris* (32 observations) and *Aerva javanica* (25 observations). The other non-target weed species recorded were *Chloris virgata*, *Argemone ochroleuca* and *Flaveria trinervia*. Broad-scale weed mapping data (along with visualisations of said data) from all five field trips will be presented in the upcoming Annual Progress Report.

4. Summary

Calotropis procera has been recorded and controlled within the three main river systems of the Woodstock Abydos Protected Reserve (Yule River, Turner River and Coorong Creek) during the first three on-country trips of 2023. Distribution and density patterns of *Calotropis* within the APR remain consistent with patterns observed in 2021 and 2022; with high levels of infestation recorded within the Turner River, and comparatively lower instances of *Calotropis* within the Yule River and Coorong Creek.

Concerns regarding the rapid invasion of *Calotropis procera* along creeklines and roadsides in the Marble Bar and Nullagine area have been frequently expressed by many members of the ranger team, including Senior Rangers and Elder. The importance of controlling *Calotropis* within the WAPR, and the need to target *Calotropis* infestations in other areas of Palyku Country (such as creeklines around Nullagine) has been discussed on each trip. Ranger Ethan Fernleigh said about the importance of controlling *Calotropis* on Palyku Country:

“If we don’t do nothing about it then our rivers will end up like that other river... the De Grey”.

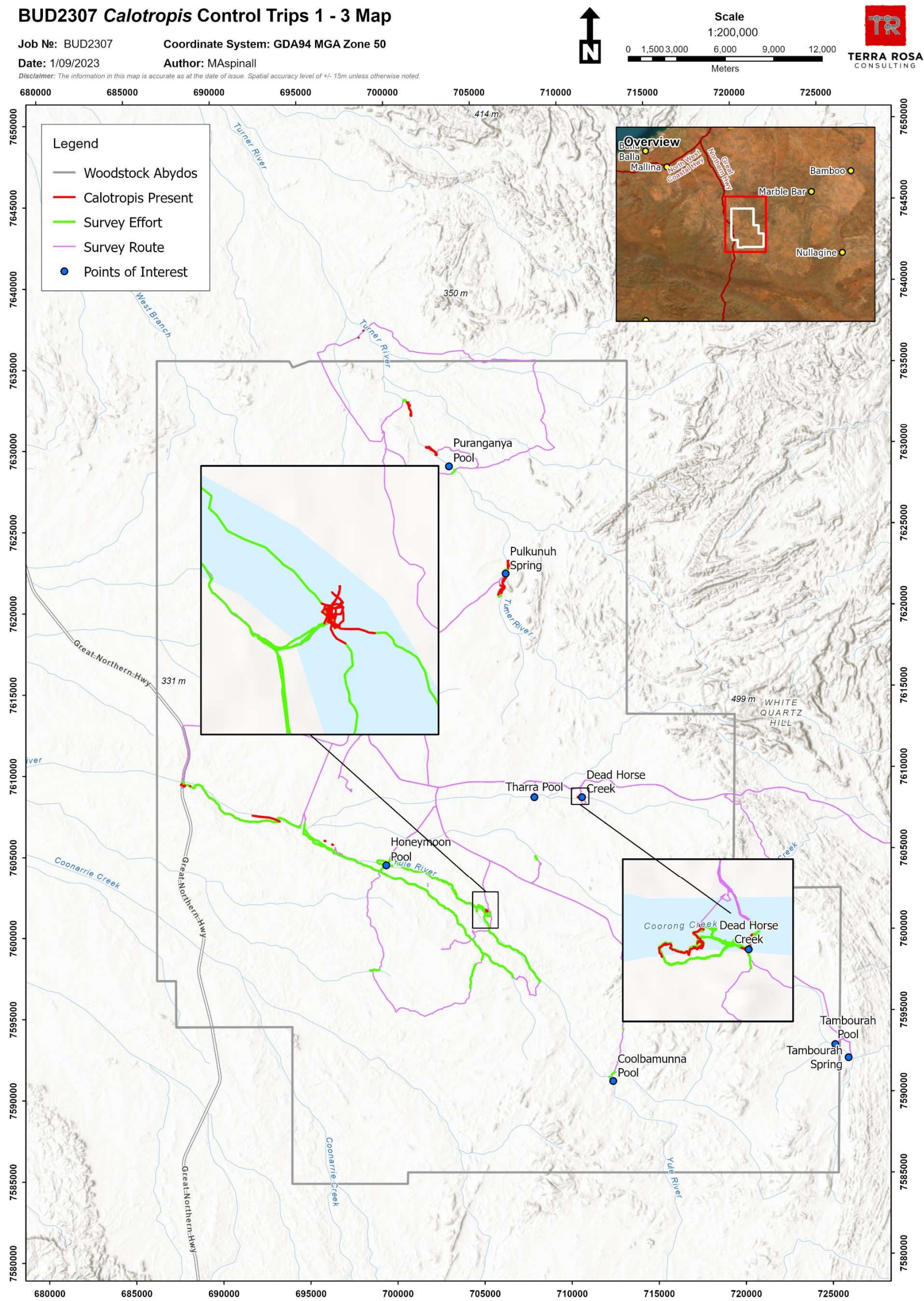
Additional recommendations based on field observations and feedback from Budadee Rangers and Elders will be presented in the upcoming Annual Progress Report.

Plate 8: Budadee Rangers at Tambourah Spring on Trip 3. From left to right: Jackie Hall, Hazel Lockyer, Fred Stream, Annabel Stream, Keniesha Cabales, Ethan Fernleigh, Natalie Stream and Gavin Cabales.



Appendix 1: Maps

Map 1: *Calotropis procera* distribution and targeted *Calotropis* survey effort within the riparian areas of WAPR recorded on Trips 1 – 3 in 2023.



Appendix 2: Project contacts

Budadee Rangers

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